

Mr. John W. James, Riley, Ill.: no sun spots were seen till the 25th, then a group about 43,000 miles long, a little west of the sun's meridian, disappearing by solar rotation on the eve of the 30th. A single spot about 16,000 miles diameter found three days east of the sun's meridian on the 30th.

Mr. M. A. Veeder, Lyons, N. Y.: on December 12th a spot of considerable size was at the western limb, and some faculae were near the eastern limb. 20th, a train of spots had formed nearly in the location of the faculae that appeared by rotation on December 12th. These spots faded out and the faculae in their location disappeared by rotation on the 24th. On the 20th a spot of considerable size was seen near the eastern limb; this spot had nearly faded out on December 22d, but on the 23d it increased again and was seen on the 25th, 26th, and 27th, followed by a train of smaller spots, which faded out before reaching the western limb. 26th, a large spot appeared by rotation and was seen on the 27th, 29th, and 31st. Observation was poor on many days in this month.

Mr. H. D. Gowey, North Lewisburgh, Ohio: sun spots 12th, 19th, 20th, 21st, 25th to 28th, 30th, and 31st.

MIRAGE.

Mirage were observed as follows: 1st, 4th, and 5th, Marquette, Nebr. 6th, Hampton, Iowa, and New England City, N. Dak. 11th, Bancroft, Iowa. 12th, Marquette, Nebr. 13th, Hampton, Iowa. 14th, Marquette, Nebr.; Woonsocket and Webster, S. Dak. 15th, Woonsocket and Webster, S. Dak. 16th and 17th, Hampton, Iowa, and Woonsocket, S. Dak. 22d, Webster, S. Dak. 26th, Marquette, Nebr.; Woonsocket and Webster, S. Dak. 27th, Marquette, Nebr., and Wolsey, S. Dak. Spearfish, S. Dak.: a fine mirage was observed on the morning of the 8th. The high lands along the Belle Fourche were lifted into plain view, and, though twenty miles away, seemed but a mile or two distant. It lasted for more than an hour, beginning with the first rays of the morning sun.

Huron, S. Dak.: a singular, fine mirage was observed soon after daylight on the 22d, and lasted for about one hour. A range of hills covered with snow was seen at a distance of four miles east of this place. The projecting white mountain peaks, with intervening white spaces, composed of lakes, covered with ice, were plainly seen.

VERIFICATIONS.

FORECASTS FOR 24 HOURS IN ADVANCE.

[Verifications made by Assistant Professor C. F. Marvin, assisted by Mr. H. E. Williams, chief clerk of the Forecast Division.]

The forecasts for districts east of the Rocky Mountains for December, 1889, were made by Captain James Allen, 3d Cavalry, Signal Officer, and those for the Pacific coast districts were made at San Francisco, Cal., by 2d Lieutenant J. E. Maxfield, Signal Corps.

Percentages of forecasts verified, December, 1889.

States.		States.	
Maine.....	79.2	Kentucky.....	87.0
New Hampshire.....	83.6	Ohio.....	84.1
Vermont.....	81.7	West Virginia.....	80.9
Massachusetts.....	82.9	Indiana.....	84.3
Rhode Island.....	85.3	Illinois.....	83.6
Connecticut.....	84.3	Lower Michigan.....	82.9
Eastern New York.....	85.2	Upper Michigan.....	77.4
Western New York.....	77.7	Wisconsin.....	83.5
Eastern Pennsylvania.....	84.1	Minnesota.....	80.1
Western Pennsylvania.....	80.5	Iowa.....	83.4
New Jersey.....	88.2	Kansas.....	82.3
Delaware.....	87.7	Nebraska.....	78.2
Maryland.....	86.5	Missouri.....	83.5
District of Columbia.....	85.0	Colorado.....	79.7
Virginia.....	84.5	North Dakota.....	83.7
North Carolina.....	87.4	South Dakota.....	80.8
South Carolina.....	86.8	Southern California*.....	85.9
Georgia.....	88.7	Northern California*.....	90.6
Eastern Florida.....	93.6	Oregon*.....	81.8
Western Florida.....	95.4	Washington*.....	80.7
Alabama.....	91.1	By elements: Weather.....	85.8
Mississippi.....	92.3	Temperature.....	83.0
Louisiana.....	91.2	Monthly percentage of weather and	
Texas.....	89.0	temperature combined†.....	84.7
Arkansas.....	85.1		
Tennessee.....	83.2		

* In determining the monthly percentage of weather and temperature combined, the Pacific coast states are not included. † The forecasts of temperature in districts east of the Rocky Mountains for December, 1889, were made with reference to the maximum temperature alone; that is, a prediction of warmer or cooler indicated that the maximum temperature of the day designated would be higher or lower than the maximum of the previous day. ‡ The monthly percentage of weather and temperature combined is determined by multiplying the percentage of weather by 6, and the percentage of temperature by 4, and dividing their sum by 10.

FORECASTS FOR 48 AND 72 HOURS IN ADVANCE.

Appreciating the great importance that long time predictions possess for the general public the Chief Signal Officer has authorized forecasts for forty-eight and seventy-two hours, covering the second and third days in advance. Such forecasts are optional with the predicting officer, and are only

made when clearly in the public interest, and cover, in all cases, considerable areas of country, and are not confined to localities.

Percentages of verifications of forecasts made for second day in advance. Number of predictions made: weather, 158; temperature, 92. Percentages of verifications: weather, 74.5; temperature, 84.9. Weather and temperature combined, 78.7.

Percentages of verifications of forecasts made for third day in advance. Number of predictions made: weather, 34; temperature, 7. Percentages of verifications: weather, 79.4; temperature, 78.6; weather and temperature combined, 79.0.

CAUTIONARY SIGNALS FOR DECEMBER, 1889.

Statement showing percentages of justifications of wind signals for the month of December, 1889:

Wind signals.—(Ordered by Captain James Allen.) Total number of signals ordered, seventy-one; justified as to velocity, wholly, fifty, partly, five; justified as to direction, sixty-two. Of the signals ordered, forty-nine were cautionary, of which thirty-five were wholly, and one partly, justified; and twenty-two were storm signals, of which fifteen were wholly, and four partly, justified. Thirty signals were ordered for easterly winds, of which twenty-two were justified, and forty-one were ordered for westerly winds, of which forty were justified. Percentage of justifications, 68.6.

Cold-wave signals.—(Ordered by Assistant Professor T. Russell.) Total number of signals ordered, two hundred and twenty-one; justified, one hundred and eighteen. Percentage of justifications, 53.4.

Percentages of local verifications of weather and temperature signals reported by directors of the various State Weather Services for December, 1889.

States.	Weather.	Temperature.	States.	Weather.	Temperature.
Illinois.....	72.1	80.4	New Jersey.....	80.1	92.2
Indiana.....	82.0	83.0	New York.....	82.6	86.3
Kansas.....	82.2	83.9	Ohio.....	88.0	82.0
Michigan.....	86.9	86.7	Pennsylvania.....	80.0	87.0
Minnesota.....	71.0	77.0	South Carolina.....	91.9	92.0
Missouri.....	76.0	79.0	Tennessee.....	82.7	78.9
Nebraska.....	82.7	88.1			

STATE WEATHER SERVICES.

[Temperature in degrees Fahrenheit; precipitation, including melted snow, in inches and hundredths.]

The following extracts and summaries are republished from reports for December, 1889, of the directors of the various state weather services:

ALABAMA.

The month was mild and spring-like. All stations report it the warmest December on record; the temperature was 12.1 above the normal. The precipitation was 3.48 below the normal.

Temperature.—Highest monthly mean, 61, at Mobile; lowest monthly mean, 53.7, at Valley Head; maximum, 82, at Wiggins and Citronelle, on 15th and 16th; minimum, 20, at Valley Head, on the 1st; range for state, 63; greatest local monthly range, 56, at Valley Head; least monthly range, 39, at Elkmont.

Precipitation.—Greatest, 4.05, at Livingston; least, 0.06, at Bermuda.

Wind.—Prevailing direction, southwest.—*P. H. Mell, Signal Corps, Auburn, director.*

ARKANSAS.

Temperature.—Highest monthly mean, 68.0; lowest monthly mean, 52.6; maximum, 83, at Osceola, 13th; minimum, 19, at Heber, 31st, and at Winslow, on the 29th; range for state, 64; greatest local monthly range, 58, at Devall's Bluff; least local monthly range, 26, at Malvern.

Precipitation.—Greatest, 1.76, at Malvern; least, 0.00, at Devall's Bluff, Pine Bluff, and Texarkana.—*M. F. Locke, Commissioner of Agriculture, Little Rock, director; W. U. Simons, Sergeant, Signal Corps, assistant.*

COLORADO.

Temperature.—The mean for the state was over 8 above the average for the past three years. The temperature was almost 6 higher than that of November. The greatest monthly mean was 44.4, at Cañon City, and the least, 20.4, at Climax. The highest temperature for the state was 86, at Breckenridge, and the lowest—24, at Gunnison. The highest local monthly range of temperature was 103, at Breckenridge; the lowest was 40, at Rifle Falls. The absolute range for the state reached 110.

Precipitation.—The average of the last three years is only 0.44, the excess, therefore, is very marked, being over 100 per cent. At Fort Lewis the remarkably heavy precipitation for the month, of 7.58, is reported; and no precipitation, or a trace merely, fell at a number of stations.—*Prof. F. H. Loud, Colorado Springs, director; W. S. Miller, Corporal, Signal Corps, assistant.*

ILLINOIS.

Temperature.—Maximum, 76, at Mascoutah, 10th; minimum, 5, at Hennepin, 1st; mean of maximum, 66.6; mean of minimum, 15.2; monthly mean of maximum and minimum, 44.9.

Wind.—Prevailing direction, southwest.—*John Craig, Sergeant, Signal Corps, Springfield, in charge.*

INDIANA.

December, 1889, was exceedingly warm throughout; in fact the mean temperature for the month is the highest ever recorded.

Temperature.—Highest monthly mean, 51.5, at Scalesville; lowest monthly mean, 40.7, at Delphi and Columbia City; maximum, 74, at Scalesville, 16th; minimum 12, at Maury, 1st; range for state, 62; greatest local monthly range, 57, at Rockville; least local monthly range, 37, at Shelbyville.

Precipitation.—The rainfall was nearly everywhere below the normal for December; the greatest deficiency occurred in the central portion, 0.43, while that in the northern and eastern portions was about 0.27. Greatest, 4.90, at Marengo; least, 1.77, at Farmland.

Wind.—Prevailing directions, southeast and southwest.—*Prof. H. A. Huston, La Fayette, director; C. F. R. Wappenhans, Sergeant, Signal Corps, assistant.*

IOWA WEATHER CROP BULLETIN SERVICE.

Temperature.—Highest monthly mean, 42.6, at Keokuk; lowest monthly mean, 31.3, at Cresco; maximum, 76, at Glenwood, 28th; minimum, 1, on the 30th, at Larrabee; average maximum, 68.7; average minimum, 6.6; greatest local monthly range, 72, at Glenwood; least local monthly range, 46, at Iowa City; monthly range for the state, 75; average monthly range, 57.

Precipitation.—Greatest reported, 3.20, at Elkader; least, 0.14, at Logan.

Wind.—Prevailing direction, south.—*G. M. Chappel, Sergeant, Signal Corps, Des Moines, in charge, Iowa Weather Crop Bulletin Service.*

IOWA.

December, 1889, was extremely warm; southerly winds prevailed, and rainfall was very light.

Temperature.—The mean temperature was almost 16 above normal. During the 50 years for which we have record, the temperature of December has but once been as high, namely in 1877, when it was about 17 above normal. We may, therefore, say that so warm a December can be expected in Iowa only about four times in a century. The entire month was almost uniformly warm. Every day of the month was above normal, except the 30th, which was only 2 below normal. Again, except the 26th, 29th, 30th, and 31st, all days were more than 10 above normal.

Precipitation.—The total rainfall exceeded 1.00 throughout northeastern Iowa, while over 2.00 fell in the northeastern part of the state in parts of Allamakee, Fayette, and Clayton counties. In most of central and southern Iowa less than 0.50 fell.—*Dr. Gustavus Hinrichs, Iowa City, director.*

KANSAS.

The month has been the warmest and driest on record for the state.

Temperature.—The monthly mean temperature is 15 above the normal; highest monthly mean, 53.2, at Lakin; lowest monthly mean, 30.1, at Allison; maximum, 80, at Richfield, 12th; minimum, 0, at Manhattan and Vesper, 30th; range for state, 80; greatest local monthly range, 75, at Manhattan; least local monthly range, 48, at Morse; greatest daily range, 43.2, at Lebo, 27th; least daily range, 2, at Independence, 14th.

Precipitation.—Most of the precipitation fell in the eastern division, and the average deficiency for the state is 1.24; greatest, 0.82, at Marmaton; least, 0.00, at the greater number of stations.

Wind.—Prevailing direction, south.—*Prof. J. T. Lovewell, Topeka, director; T. B. Jennings, Sergeant, Signal Corps, assistant.*

KENTUCKY.

Temperature.—There was an excess of about 13 above the normal for December and about 6 more than the average for November. The excess far surpasses that of any previous December for which accurate records are accessible. The record of the central station extends backward for twenty years, and the mildest December in that period was in 1875, when the mean for the month was 45. The highest temperature recorded during the month was 73, at Springfield, 19th, and the lowest, 13, at Ashland, 1st.

Precipitation.—The average precipitation is about 3.00 less than the normal for the month. At the central station the year closed with a deficiency of 14.87, or about 30 per cent. of the normal for the year. The greatest rainfall reported was 2.36 at Frankfort, and the least, 0.11, at South Fork. No snowfall is reported for the month.

Wind.—Prevailing direction, south.—*Dr. E. A. Grant, Louisville, director, Frank Burke, Sergeant, Signal Corps, assistant.*

LOUISIANA.

The past month was the warmest and driest December on record.

Temperature.—Highest monthly mean, 66.2, at New Iberia; lowest monthly mean, 58.7, at Farmerville; maximum, 90, at New Iberia, 11th; minimum, 23, at Plaquemine, 1st; range for the state, 67; greatest local monthly range, 58, at Plaquemine and Luling; least, 34, at Shell Beach; mean daily range, 22.1.

Precipitation.—Greatest local monthly rainfall, 3.75, at Grand Coteau; least local monthly rainfall, 0.20, at Point Eads.

Wind.—Prevailing direction, south.—*R. E. Kerkam, Sergeant, Signal Corps, New Orleans, in charge.*

MICHIGAN.

Temperature.—The mean temperature is 7.9 above the normal of fifteen years, and is the next highest monthly temperature reported in that period, the highest being 37.2 in 1877; highest monthly mean, 42.9, at Benton Harbor; lowest monthly mean, 24.8, at Atlantic; maximum, 65, at several stations on 24th to 29th; minimum, —8, at Lathrop, 31st; range for state, 73; greatest local monthly range, 58, at Ionia and Hillman; least local monthly range, 35, at Columbiaville; greatest daily range, 52, at Ionia, 4th; least daily range, 1, at Manistee, 17th.

Precipitation.—The average for the state is 0.15 above the normal; it was above the normal in all sections, from 0.04, in the southern section, to 0.99 in the upper peninsula; greatest, 4.72, at West Branch; least, 0.91, at Charlevoix.

Wind.—Prevailing direction, southwest.—*N. B. Conger, Sergeant, Signal Corps, Lansing, director.*

MINNESOTA.

Temperature.—Highest monthly mean, 33.8, at La Crosse, Wis.; lowest monthly mean, 10.6, at Saint Vincent; maximum, 61, at La Crosse, Wis., 24th; minimum, —29, at Pokegama Falls, 30th; range for state, 90; greatest local monthly range, 73, at Pokegama Falls; least local monthly range, 46, at Farmington; greatest daily range, 45, at Saint Vincent, 14th; least daily range, 2, at Saint Paul, 3d, and at La Crosse, Wis., 17th.

Precipitation.—Greatest, 3.60, at Saint Charles; least, 0.22, at Crookston.

Wind.—Prevailing direction, south.—*John Healy, Private, Signal Corps, Saint Paul, in charge.*

MISSISSIPPI.

Temperature.—The mean temperature is 13.2 above the normal. Highest monthly mean, 63, at Vicksburg; lowest, 24.4, at Corinth; the greatest local monthly range was 60, at Louisville, and the least, 89, at Pearlinton.

Precipitation.—The average precipitation is 42.8 below the normal for December. This deficiency added to that at the beginning of the month makes the total deficiency for the year 17.79.

Wind.—Prevailing direction, south.—*R. B. Fulton, Signal Corps, University, director.*

METEOROLOGICAL REPORT OF THE MISSOURI STATE BOARD OF AGRICULTURE.

The temperature was about 16 above the normal over the entire state. The rainfall was about 1.50 below the normal, the only exceptions to this deficiency being Oak Ridge and Ironton, where the amount was above the normal.

Temperature.—Highest monthly mean, 55.3, at Proteum; lowest monthly mean, 41.1, at Harris; maximum, 80, on the 13th, at Proteum; minimum, 2, on the 30th, at Craig; range for the state, 78; greatest local monthly range, 73, at Craig; least local monthly range, 47, at Oak Ridge.

Precipitation.—Greatest, 4.60, at Oak Ridge; least, 0.00, at Conception, and trace at Kidder. No snow fell except at Wither's Mill, where 3.00 fell.—*Levi Chubbuck, Secretary of State Board of Agriculture, Columbia, director; A. L. McRae, Sergeant, Signal Corps, assistant.*

NEBRASKA.

December has been a remarkable month as regards its very high temperature and the very small amount of precipitation.

Temperature.—The highest December mean heretofore recorded was 33.2, in 1881; rarely has it been so high as 30, and the normal for December is only 24.5. Indeed, the mean temperature of December this year has been 4 above that of November. The month has also been remarkable for the ex-

trema range of its temperature. A maximum of 80 is reported at Weston, and the minimum reached —14 at Fort Niobrara.

Precipitation.—No December heretofore has given us so little precipitation. Very rarely is there less than 0.50, and the normal for December is 0.75 for southeastern Nebraska. The precipitation over the state for the past month has ranged from a little over an inch at two widely remote stations in the northeast and southwest to a mere trace or none at all over the southeastern counties.—*Prof. Goodwin D. Swezey, Crete, director; G. A. Loveland, Sergeant, Signal Corps, assistant.*

NEVADA.

Temperature.—The mean temperature for the month was slightly below the normal, which, however, is due to the warm days during the first of the month, as the latter part of the month was severe in most localities. During this period the temperature was very low for the month of December, having been recorded as —20 at Elko, —19 at Beowawe, and —14 at Ely, these being the lowest reported. The maximum temperature was reported from El Dorado Canyon, 69.9, 2d, the extreme range for the state being 89.9. The lowest mean temperature reported was 25.2, at Tuscarora, and the highest, 55.7, at El Dorado Canyon.

Precipitation.—December, 1889, will go upon record as an exceptional month as regards precipitation. The greatest amount of precipitation reported was 11.12 at Pioche. Following this came Leonard's Creek with 9.43; Tuscarora, 9.28; Lewers' Ranch, 5.44, and Genoa, 7.55. The greatest amount of snow which fell at one station was at Tuscarora, 81.50, for the month, with 42.00 on the ground December 31.

Wind.—Prevailing direction, south.—*Prof. Chas. W. Friend, Carson City, director; H. E. Wilkinson, Corporal, Signal Corps, assistant.*

NEW ENGLAND METEOROLOGICAL SOCIETY.

December will be remembered as the warmest month of that name during the past quarter of a century. The mean temperature was 6.4 above the normal for the season, and this was attained by an equable temperature throughout the month and not by large individual departures.

Temperature.—Highest monthly mean, 41.4, at Block Island; lowest monthly mean, 22.7, at Berlin Falls; maximum, 71, at Olneyville, 25th; minimum, —22, at West Milan, 4th; range for New England, 93; greatest local monthly range, 72, at West Milan; least local monthly range, 30, at Nantucket; greatest daily range, 50, at West Milan, 1st; least daily range, .0, at Concord, 3d; Lunenburg, 9th and 21st; Princeton, 18th. The average temperature for December for 25 stations, having records for more than ten years, is 27.5; the average for December, 1889, is 33.8, departure, +6.3.

Precipitation.—Greatest, 5.92, at Bar Harbor; least, 0.95, at Block Island. The average precipitation for December for 34 stations, having records for more than ten years, is 3.55; the average for December, 1889, is 3.04; departure, —0.51.

Wind.—Prevailing direction, northwest.—*Prof. William H. Niles, Boston Mass., president; Prof. Winslow Upton, Providence, R. I., secretary; L. G. Schultz, Sergeant, Signal Corps, assistant.*

NEW JERSEY.

Temperature.—The mean temperature is 9.0 above the average for the month, and 6.6 above the average for the corresponding month of 1888; highest monthly mean, 46.6, at Cape May C. H.; lowest monthly mean, 37.8, at Hanover; maximum, 71, at Beverly, 25th; minimum, 8, at Hanover and Plainfield, 4th and 5th, respectively; range for the state, 63; greatest local monthly range, 60, at Plainfield; least local monthly range, 38, at Ocean City; greatest daily range, 45, at Gillette, 4th; least daily range, 1, at Trenton and Asbury Park, 14th and 18th, respectively.

Precipitation.—The average precipitation is 2.00 below the average, and 2.07 below the average for the corresponding month of 1888.

Wind.—Prevailing direction, southwest.—*E. W. McGann, Sergeant, Signal Corps, New Brunswick, in charge.*

NEW YORK.

Temperature.—The highest temperature reported was 70, at Erie, Pa., 29th; the lowest, 6.5, at Canton, 4th. The 25th was the warmest, and the 4th the coldest day. The greatest local monthly range of temperature was 62, at Auburn and Middleburgh, and the least range, 45, at Buffalo and Spencerport. The temperature was everywhere greatly above the normal.

Precipitation.—The rainfall was generally above the average, excepting along Lake Ontario, and also in the Hudson Valley, where the only station reporting an excess is Rondout. The greatest monthly rainfall was 6.14, at Constableville; the least, 1.37, at Malone. The average number of days on which the precipitation was .01 or more of rain or melted snow was 13.8. The greatest monthly snowfall was 10.00, at Constableville and Queensbury.

Wind.—Prevailing direction, southwest.—*Prof. E. A. Fuytes, Ithaca, director; I. W. Brewer, Private, Signal Corps, assistant.*

NORTH CAROLINA.

December, 1889, was a remarkably mild and dry month. The departure from the normal temperature was greatest in the central and western portions of the state, where at every station the mean for December was higher than that for the preceding November. The rainfall was the least since 1871.

Temperature.—The monthly mean is 10.3 above the normal for December; highest 78, 24th, at Newbern; lowest 12, 1st, at Franklin; range for the state, 66; highest monthly mean, 59.3, at Southern Pines; lowest monthly mean, 47.6, at Franklin; greatest local monthly range, 60, at Franklin; least local monthly range, 31, at Hatteras; mean maximum, 63; mean minimum, 48.

Precipitation.—The average for the state is 4.26 below the normal; greatest monthly, 1.68, at Marion, Va.; least monthly, 0.10, at Southport. The only station in the state having a total of 1.00 was Southern Pines.

Wind.—Prevailing direction, southwest; average direction from many years observations, southwest.—*Dr. Herbert B. Battle, Raleigh, director; C. F. von Herrmann, Sergeant, Signal Corps, assistant.*

NORTH AND SOUTH DAKOTA.

Temperature.—Highest monthly mean, 34.4, at Yankton, S. Dak.; lowest monthly mean, 10.6, at Saint Vincent, Minn.; maximum, 76, at Parkston, S. Dak., and Valentine, Nebr., 7th; minimum, —21, at Webster, S. Dak., and Saint Vincent, Minn., 30th; greatest local monthly range, 72, at Woonsocket, S. Dak.; least local monthly range, 42, at De Smet, S. Dak.; greatest daily range, 50, at Huron, S. Dak., 26th; least daily range, 1, at Fort Sully, S. Dak., 31st. The mean temperature for the state is about 8.7 above the normal.

Precipitation.—Greatest monthly, 2.63, at Webster, S. Dak.; least monthly, 0.03, at Gallatin, N. Dak. The average precipitation for the states is about 0.25 above the normal.

Wind.—Prevailing direction, southeast.—*S. W. Glenn, Sergeant, Signal Corps, Huron, in charge.*

OHIO.

Temperature.—This was the warmest December on record in the bureau. The mean temperature was 11.5 above the average for the past eight years, and 10.5 above the highest previous record, 33.3, in December, 1888. The means in the northern, middle, and southern sections were 10.4, 11.9, and 12.3, respectively, above the eight year average. The maximum temperature, 73, occurred at Hanging Rock, 10th, and is the highest maximum since 1886. The minimum temperature, 10, occurred at Wapakoneta, 1st, and is the highest minimum on record for December. The average daily range of temperature was 19.1; the greatest daily range was 38.9, at McConnellsville, 2d, and the smallest, 2, at Columbus, 18th.

Precipitation.—The mean rainfall in the northern section was 0.96 above the average; the mean for the state was also above the average, being 0.23 in excess of the usual rainfall for December; the means in the northern and southern sections were 0.02 and 0.26 below the average for December; the greatest monthly rainfall reported was 5.32, at Poland, and the smallest, 1.45, at Wapakoneta.—*Prof. B. F. Thomas, Columbus, director; Lieut. Charles E. Kilbourne, secretary; C. M. Strong, Corporal, Signal Corps, assistant.*

OREGON.

Temperature.—The mean temperature is 2.9 below the average; highest monthly mean, 46.3, at Bandon; lowest monthly mean, 23.2, at Joseph. Along the coast the mean average was 41; in the interior valleys, 37, and in the eastern part of the state, 30; maximum temperature, 58, at Bandon; minimum, —10, at Silver Lake. The least ranges of temperature, 18 to 29, occurred along the coast, and the greatest, from 55 to 61, in Malheur county.

Precipitation.—The precipitation was below the normal in all parts of the state. West of the Cascades the deficiency averaged 2.00, and east of them 1.00. Along the coast from 8.00 to 17.00 fell; in the interior valleys from 3.00 to 8.00, and in eastern Oregon from 0.65 to 4.00, except at the Cascade locks, where 8.00 was recorded. The greatest amount, 17.25, fell at Ellensburg, and the least, 0.65, at Umatilla. Snow fell in all parts of the state, except along the coast, in depths ranging from 0.5, at Eugene, to 31.00 at Hood River.

Wind.—Prevailing direction, southeast.—*Hon. H. E. Hayes, Master State Grange, Oswego, director; B. S. Pague, Sergeant, Signal Corps, assistant.*

PENNSYLVANIA.

Temperature.—The mean temperature for December, 1889, is about 9 in excess of the normal, and as compared with Philadelphia temperatures for the past one hundred years and over, it was the warmest December on record. The greatest departures were in the western part of the state, where the mean temperature for the month averaged 11 above the normal. In the eastern portion it was about 7 above. There was a complete absence of the low temperatures that usually occur in December, and the maximum temperatures were decidedly higher. The highest temperatures reported were Centre Valley, 73; Lewiston, Erie, and Waynesburgh, 70; and Coatesville, 68. The lowest were Le Roy and Eagle's Mere, 0; Somerset, 6; Wysox, Grampian Hills, Wellsborough, Columbus, Dyberry, and Honesdale, each 8. The lowest temperature occurred on the 4th, and the highest during the 25th.

Precipitation.—The total precipitation is 0.20 less than the average. There was a slight excess in the western part of the state and a deficiency in the eastern. The greatest totals were Columbus, 5.05; Grampian Hills, 4.67; Johnstown, 4.62; Tipton, 4.49; and Somerset, 4.29. The least were Philadelphia, 0.85; Germantown, 0.91, and Swarthmore, 1.05. The only snow that occurred was in the northeastern part of the state, Dyberry reporting the greatest, 7 inches.

Wind.—Prevailing direction, west.—*Under direction of the Franklin Institute, Philadelphia; T. F. Townsend, Sergeant, Signal Corps, assistant.*

SOUTH CAROLINA.

Temperature.—The mean temperature for the state is over 10 warmer than that for the same month in 1887 and 1888, and as shown by meagre meteorological records, it was the warmest December for twenty years. Highest monthly mean, 60.1, at Timmonsville; lowest monthly mean, 48.4, at Camden; maximum, 79.0, at Conway and Trial, 11th; minimum, 17.0, at Spartanburgh, 2d; greatest local monthly range, 61.0, at Spartanburgh; least local monthly range, 38.0, at Port Royal and Timmonsville.

Precipitation.—Greatest monthly, 1.07, at Aiken; least monthly, 0.00, at

Conway, Hardeeville, and Port Royal. Reports show that this is the least rainfall for December that has ever been recorded in this state.

Wind.—Prevailing direction, southwest.—*Hon. A. P. Butler, Columbia, director; J. W. Cronk, Sergeant, Signal Corps, assistant.*

TENNESSEE.

The meteorological features for December were, in some respects, rather phenomenal, the principal of which were the high temperature that prevailed during the month, except the first and last days, the abnormally small amount of rainfall and electrical disturbance, and absence of high winds.

Temperature.—The December mean was 14 above the average for seven years; the highest monthly mean was 60.4, at Bolivar, and the lowest, 48.4, at Rogersville; maximum, 78, at Bolivar, 15th, at Austin, 21st, and at McKenzie, 19th and 25th. Except in 1883, this was the highest December maximum during the past seven years. The minimum temperature was 17, recorded at Springdale on the 1st, and was the highest minimum during the past seven years, the lowest being -8, in 1886. The daily ranges of temperature were about normal.

Precipitation.—The average monthly rainfall for the state was much the smallest rainfall during the past seven years, being nearly 2.50 less than the average for that period. It was, perhaps, the smallest December rainfall during the past twenty years; greatest monthly rainfall, 3.22, at Lynnville; least, 0.44, at Chattanooga.

Wind.—Prevailing directions, south and southwest.—*J. D. Plunket, M. D., Nashville, director; H. C. Bate, Signal Corps, assistant.*

TEXAS.

Temperature.—The mean temperature for the month is from 8 to 15 above the 15-year normals. This is unusually warm for the month of December, and nothing to compare with it has occurred since 1875. Maximum, 85, at Gallinas, 10th; minimum, 12, at Panhandle, 30th.

Precipitation.—The rainfall for the month was unusually light, not reaching half an inch, except at Brenham, where it amounted to 0.72. The normal precipitation for December over the agricultural portion of the state east of the ninety-eighth meridian is about 2.00, and the fall for the month has been almost ten per cent. of that amount.—*D. D. Bryan, Galveston, director; I. M. Cline, Sergeant, Signal Corps, assistant.*

Meteorological record of Army post surgeons, voluntary, and other co-operating observers, December, 1889.

*Extremes of temperature from observed readings. †Signal Service instruments. ‡One observation daily at 10.00 a. m.

Letters of the alphabet denote the number of days missing from the record, thus: the letter c indicates three days missing in a thirty-one day month, etc., etc.

Corrections: In November miscellaneous table of voluntary observers, Quitman (2), Ga., for total precipitation, 0.25, read 1.35. Sycamore, Ill., total precipitation for June should be 1.96, instead of 1.50; and for February, 1.16 instead of 0.86.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean.			Max.	Min.	Mean.	
<i>Alabama.</i>	0	0	0	<i>Ins.</i>	<i>Arkansas—Cont'd.</i>	0	0	0	<i>Ins.</i>
Bermuda †.....	78	25	57.0	0.06	Deval's Bluff †.....	78	20	53.1	0.00
Butler.....	77	20	59.2	1.55	El Dorado †.....	74	26	57.0	0.46
Citronelle.....	82	29	64.2	1.06	Forrest City †.....	80	28	61.6	0.40
Columbiana †.....	75	23	58.8	2.14	Fulton †.....	76	22	58.4	0.46
Decatur (1) †.....	75	23	58.8	1.10	Heber.....	76	19	56.1	0.26
Decatur (2) †.....	75	23	58.8	0.73	Helena (1) †.....	82	26	60.0	0.40
Double Springs *.....	78	25	59.6	0.67	Huntington.....	79	34	64.8	0.19
Elkmount †.....	75	36	58.6	1.07	Lead Hill.....	80	20	55.3	1.15
Evergreen †.....	76	22	56.5	0.71	Little Rock B'ks.....	78	26	59.3	0.00
Fayette C. H. †.....	76	22	56.5	1.20	Lonoke.....	80	28	62.2	0.00
Gadsden †.....	77	24	56.9	1.07	Malvern †.....	76	54	68.0	1.76
Greensborough †.....	76	30	60.3	2.19	Monticello †.....	76	38	57.4	0.96
Livingston (1).....	77	26	57.4	4.05	Newport (1) †.....	83	25	56.6	0.56
Mt. Vernon B'ks.....	81	28	60.3	1.63	Osceola †.....	83	25	56.6	0.25
Pine Apple †.....	74	24	59.6	0.95	Ozone †.....	71	23	55.4	0.56
Tuscumbia (1).....	74	24	59.6	0.95	Pine Bluff †.....	76	28	60.4	0.00
Uniontown.....	76	28	60.8	1.02	Stuttgart †.....	76	24	58.8	0.28
Valley Head †.....	76	20	52.5	1.42	Texarkana †.....	80	40	62.8	0.00
Wiggins.....	82	28	57.7	0.57	Washington †.....	79	30	60.7	0.19
<i>Alaska.</i>					Winslow †.....	70	19	53.0	0.47
Juneau.....	40	5	28.4	5.40	<i>California.</i>	62	41	50.1	13.04
Killisnoo.....	41	13	29.7	2.40	Alcatraz Island.....	62	41	50.1	13.04
<i>Arizona.</i>					American Hill.....	71	26	44.2	21.22
Ash Creek.....	33	52.2	1.13	1.13	Anderson.....	65	27	43.8	18.24
Ash Springs.....	33	52.2	1.13	1.13	Angel Island.....	65	33	49.2	11.28
Chiri Cahua Mts.....	4.20	0.12	0.12	0.12	Arcata.....	62	32	47.8	11.18
Cooley's Springs †.....	0.12	0.07	0.07	0.07	Berkeley.....	60	36	48.4	12.59
Dos Cabezas.....	0.07	0.07	0.07	0.07	Campo.....	65	43	52.8	9.34
Dragon.....	66	17	45.0	1.95	Centerville *.....	66	38	53.0	12.13
Fort Apache.....	74	25	52.3	0.51	Colegrove.....	67	32	51.5	15.40
Fort Bowie.....	69	27	51.4	0.75	Crescent City.....	67	32	51.5	15.40
Fort Huachuca.....	87	29	56.6	1.58	Evergreen.....	67	32	51.5	15.40
Fort Lowell.....	77	32	54.9	5.47	Ferndale *.....	67	32	51.5	15.40
Fort McDowell.....	72	32	52.5	11.17	Fort Bidwell.....	49	4	27.8	3.78
Fort Mojave.....	65	26	48.8	5.62	Fort Gaston.....	56	29	42.2	13.94
Fort Verde.....	76	42	57.8	2.80	Fort Mason.....	62	38	50.7	14.08
Gila Bend *.....	71	26	50.0	0.65	Georgetown †.....	52	29	39.8	22.94
Lochiel *.....	76	26	50.0	0.55	Grass Valley.....	59	29	44.0	12.66
Prues Ranch.....	72	26	50.9	2.05	Hydesville †.....	55	29	41.1	21.04
San Carlos.....	72	26	50.9	2.05	Iowa Hill *.....	63	35	44.6	13.76
Strawberry †.....	12.38	0.20	0.20	0.20	Jolon.....	63	35	44.6	13.76
Tevison.....	76	31	55.2	1.59	Juliant.....	63	35	44.6	13.76
Tucson (1) †.....	76	31	55.2	0.54	La Grange *.....	63	37	50.1	7.64
Walnut Ranch.....	78	23	57.0	0.65	Lewis Creek.....	64	33	49.5	4.42
<i>Arkansas.</i>					Loomis.....	64	33	49.5	4.42
Arkansas City †.....	78	29	61.2	0.10					
Camden †.....	78	23	57.0	0.65					
Conway.....	78	23	57.0	0.65					

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<i>California—Cont'd.</i>	0	0	0	<i>Ins.</i>	<i>Georgia—Cont'd.</i>	0	0	0	<i>Ins.</i>
Los Banos *.....	62	35	50.4	5.54	Milledgeville * †.....	73	25	55.8	0.39
Los Gatos (1).....	62	35	50.4	20.73	Monticello †.....	73	32	54.6	0.88
Mendocino.....	68	29	56.5	17.21	Point Peter *.....	72	25	53.8	0.85
National City †.....	68	34	55.9	8.13	Quitman (1) *.....	76	33	60.0	T.
Needles.....	75	29	56.5	3.30	Woolley's Ford *.....	72	22	51.2	.....
Oakland (1) *.....	67	34	49.9	13.38	<i>Idaho.</i>				
Orville.....	61	33	49.3	13.50	Boise Barracks.....	53	8	32.9	1.48
Pasadena.....	67	33	52.4	17.05	Era †.....	49	0	26.6	.....
Presidio of San F.....	64	33	50.7	13.97	Fort Sherman.....	44	0	30.4	5.85
Riverside *.....	63	32	51.6	6.87	Kootenai †.....	42	4	25.7	3.70
Sacramento (1).....	60	27	44.1	8.59	Soda Springs †.....	45	-18	27.4	5.54
Salinas (1) *.....	65	35	49.3	8.72	<i>Illinois.</i>				
San Diego B'ks.....	69	37	57.1	7.38	Aurora (1) †.....	61	12	37.4	.....
Santa Barbara (1).....	68	40	54.2	10.64	Aurora (2) *.....	65	13	39.5	2.53
Santa Clara *.....	63	33	50.8	10.78	Beardstown.....	65	15	42.8	0.40
Santa Maria.....	68	32	52.2	6.71	Beason.....	65	15	42.8	1.50
Sonoma.....	61	36	51.0	11.47	Belvidere.....	58	15	37.7	1.88
Steeles.....	61	36	51.0	11.60	Centerville.....	70	18	48.5	1.60
Stockton (1).....	52	2	32.9	8.55	Collinsville.....	73	19	48.8	1.30
Susquahanna.....	72	30	45.4	29.36	Dwight.....	65	15	41.2	1.79
Upper Mattole.....	62	32	48.6	12.95	Flora.....	71	19	48.0	2.11
Vacaville (1) *.....	62	32	48.6	12.95	Fort Sheridan.....	60	13	39.2	4.75
Walla Walla Creek *.....	53	12	33.0	8.09	Gibson City *.....	66	12	41.6	1.75
Walnut Creek.....	62	33	49.3	9.94	Goconda *.....	74	24	53.0	2.53
Wheatland.....	59	31	46.9	7.51	Grand Tower †.....	67	16	46.8	3.40
Willow (1) †.....	60	29	45.4	8.12	Greenville.....	71	11	41.0	1.57
<i>Canada.</i>					Griggsville *.....	67	11	41.0	2.02
McGill Col. Observ- atory, Montreal.....	46	-7	23.8	4.39	Hennepin.....	69	5	38.9	1.45
<i>Colorado.</i>					Hilton *.....	66	8	45.9	1.41
Delta †.....	56	12	33.8	3.15	Irishtown.....	69	5	38.9	1.48
Eagle Farm.....	66	3	32.0	0.02	Jordans Grove *.....	72	21	48.3	1.66
Fort Collins.....	59	0	38.0	1.20	Lacon.....	63	12	42.1	1.77
Fort Crawford.....	52	-5	31.3	7.68	Lake Forest.....	60	9	36.8	2.66
Fort Lewis.....	70	1	41.1	0.30	Lanark *.....	61	9	38.2	2.63
Fort Logan.....	-24	15.8	1.88	0.82	Louisville.....	70	24	48.3	1.60
Fraser †.....	53	7	34.5	0.70	Martinsville.....	68	24	47.1	0.91
Fruita.....	53	7	34.5	0.70	Mascoutah *.....	76	16	47.1	1.60
Georgetown.....	59	6	34.8	0.22	Mattoon *.....	66	20	45.2	2.25
Greeley.....	59	6	34.8	0.22	McLeansborough.....	72	21	51.4	1.77
La Porte.....	59	6	34.8	0.22	Mount Carmel †.....	72	21	51.4	2.82
Le Roy.....	59	6	34.8	0.22	Olney.....	70	22	47.6	3.96
Livermore.....	59	6	34.8	0.22	Oneida.....	66	8	40.5	1.90
Middle Box Elder.....	68	3	37.6	0.45	Oswego *.....	62	12	38.3	1.91
Palmer Lake.....	70	8	35.0	0.45	Ottawa †.....	64	18	42.1	1.80
Rocky Ford.....	56	-9	31.8	1.23	Palestine.....	72	23	48.6	1.93
San Luis Ex. Sta.....	56	-9	31.8	1.23	Pana.....	70	20	48.2	4.33
Upper Pine.....	56	-9	31.8	1.23	Pekin.....	66	10	43.2	1.16
<i>Connecticut.</i>					Peoria (1) *.....	65	14	43.5	1.64
Birmingham.....	61	4	38.0	2.86	Peoria (2) *.....	65	14	43.5	1.33
Canton.....	61	4	38.0	2.86	Philom.....	67	16	43.4	2.04
Clark's Falls.....	61	4	38.0	2.86	Pontiac.....	64	14	41.4	1.65
Colchester.....	65	8	37.3	2.48	Riley.....	58	11	36.2	1.44
Falls Village.....	58	13	38.4	3.01	Rockford.....	61	14	37.8	2.88
Fort Trumbull.....	58	13	38.4	3.01	Rock Island Ars'l.....	65	10	41.3	1.56
Hartford (1).....	65	6	34.6	3.26	Rushville.....	66	13	41.7	1.20
Hartford (2).....	65	6	34.6	3.26	Sandwich *.....	65	18	41.3	1.82
Lake Konomoc.....	63	5	35.1	2.94	Sycamore *.....	60	12	37.3	1.52
Lebanon.....	63	5	35.1	2.94	Warsaw †.....	65	18	41.9	0.18
Mansfield.....	66	5	36.0	3.02	Watseka.....	65	18	41.9	1.53
Middletown.....	63	5	35.1	2.88	Whitcomb.....	60	12	36.7	.....
New Britain.....	63	5	35.1	2.88	White Hall *.....	70	14	47.0	0.06
New Hartford (1) *.....	54	-2	25.1	2.98	Winnebago.....	62	11	38.6	2.83
New Hartford (2).....	54	-2	25.1	2.98	Woodstock.....	56	6	34.1	2.20
Shelton.....	65	12	36.5	1.93	<i>Indiana.</i>				
Southington *.....	64	6	35.4	2.54	Angola.....	64	17	42.3	2.34
South Manchester.....	64	6	35.4	2.54	Blue Lick.....	66	27	49.6	2.49
Thompson.....	62	6	34.8	2.66	Buttville *.....	66	27	49.6	2.77
Uncasville.....	62	6	34.8	2.66	Cannelton.....	71	19	45.0	2.81
Voluntown *.....	60	11	38.6	3.40	Columbia City.....	64	18	40.7	2.10
Wallington.....	60	11	38.6	3.40	Columbus.....	66	24	46.4	2.59
Waterbury.....	63	7	35.5	2.74	Connorsville.....	66	20	45.7	3.04
West Simsbury.....	63	7	35.5	2.47	Danae.....	70	25	45.2	2.15
<i>Delaware.</i>					De Gonia Springs.....	70	25	45.1	3.65
Kirkwood *.....	68	25	45.8	.....	Delphi.....	64	16	40.7	1.79
<i>District of Columbia.</i>					Evansville †.....	64	26	45.8	3.57
Kendall Green *.....	68	25	45.8	.....	Farmland.....	64	26	45.8	1.77
Washington B'ks.....	70	20	44.4	0.30	Franklin.....	67	21	45.6	2.00
<i>Florida.</i>					Huntingburgh.....	68	28	50.0	4.55
Altamonte Springs †.....	82	45	66.1	0.00	Huntington †.....	68	28	50.0	2.77
Alva †.....	85	43	64.1	0.16	Jeffersonville.....	60	21	49.6	2.22
Archer †.....	84	35	62.8	0.00	La Fayette.....	68	19	43.8	2.01
Fort Barrancas.....	80	27	61.5	0.39	Logansport.....	68	19	43.8	2.50
Fort Meade *.....	80	43	64.3	0.00	Marengo.....	71	20	51.2	4.90
Homeland *.....	82	46	64.2	0.00	Marion.....	66	20	43.3	2.63
Lake City †.....	83	34	61.5	0.00	Mauzy.....	65	12	41.8	2.13
Madison †.....	72	35	61.4	0.00	Mount Vernon (1) †.....	68	25	49.0	3.41
Manatee †.....	90	44	63.0	0.00	Mount Vernon (2).....	68	25	49.0	3.41
Matanzas *.....	78	53	62.9	0.21	Muncie.....	65	25	46.6	.....
Merritt's Island †.....	79	52	67.7	0.00	Point Isabel *.....	65	22	43.5	5.20
Ocala *.....	78	46	60.6	0.00	Princeton.....	70	24	49.0	3.60
St. Francis B'ks.....	76	43	62.5	0.12	Richmond.....	68	15	43.0	2.92
Tallahassee.....	78	32	58.8	0.00	Rockville.....	76	19	47.2	4.05
Villa City †.....	80	50	64.5	T.	Rushville †.....	64	16	40.7	1.80
<i>Georgia.</i>					Scalesville.....	74	28	51.5	2.01
Athens (1).....	72	26	55.2	0.63	Seymour.....	67	24	48.0	3.44
Athens (2) †.....	72	26	54.8	0.58	Shelbyville.....	66	28	46.6	4.35
Camilla *.....	80	32	56.4	T.	Spiceland.....	67	19	46.5	3.06
Diamond *.....	80	32	55.2	1.10	Sunman †.....	68	19	45.0	3.40
Forsyth.....	82	32	61.3	0.79	Vevay.....	72	18	49.0	2.81
Fort McPherson.....	74	26	56.3	0.72	Vincennes †.....	72	23	45.3	2.14
Gillville *.....	76	30	59.8	0.39	Worthington.....	64	23	45.3	.....
Hephzibah *.....	76	32	59.0	0.06	<i>Indian Territory.</i>				
Jesup †.....	73	22	54.7	0.56	Cantonment.....				0.00
Marietta †.....	73	22	54.7	0.56	Enfaula †.....	78	22	53.5	0.20
					Fort Gibson.....	78	22	53.5	0.24